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COMPUTERIZED ADAPTIVE TESTING (CAT): A USER MANUAL

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A joint-service effort is underway to develop a computerized adaptive testing (CAT) system and to evaluate its potential for replacing the paper-and-pencil Armed Forces Vocational Aptitude Battery, used for military personnel classification and assignment. To enable evaluation of CAT's operations, psychometric characteristics, and predictive utility, a prototype system was developed for use in assessing the feasibility of CAT with Army, Air Force, Marine Corps, and Navy recruits. This report provides a user manual describing the experimental CAT system hardware and procedures for administering personnel classification tests on the system.

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FOREWORD

A joint-service coordinated effort is in progress to develop a computerized adaptive testing (CAT) system and to evaluate its potential for use in the military entrance processing stations as a replacement for the Armed Services Vocational Aptitude Battery (ASVAB) printed tests. The Department of the Navy (Headquarters, U.S. Marine Corps) has been designated as lead service for CAT system development; and the Navy Personnel Research and Development Center, as lead laboratory. This effort is being conducted in support of project ZF63-521-030-101-04.12 (USMC Computerized Adaptive Testing).

This report is the seventh in a series being issued under the CAT project. Previous reports described CAT system functional requirements and schedules, preliminary design considerations, the influence of fallible item parameters on adaptive testing, the relationship between corresponding ASVAB and CAT tests, a theoretical foundation for adaptive administration of aptitude tests, and the Computerized Adaptive Screening Test (CAST), a screening test to be used at recruiting stations to predict ASVAB performance (NPRDC Tech. Note 82-22 and Tech. Reps. 82-52, 83-15, 83-27, 83-32, and 84-17). This report provides a manual describing the experimental CAT hardware system and test administration procedures. System software will be described in a subsequent report.

This manual will be used by researchers and proctors as a guide for operating the prototype system at Army, Air Force, Marine Corps, and Navy testing sites.

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INTRODUCTION

Background and Problem

A joint-service project is underway to develop a computerized adaptive testing (CAT) system. The objectives of that project are to evaluate the feasibility of CAT for enlisted personnel selection and classification testing and to develop a capability for operational implementation of a CAT system. If realized in testing practice, the advantages of adaptive testing over conventional paper-and-pencil tests could lead to the replacement of the present Armed Services Vocational Aptitude Battery (ASVAB) (McBride, 1982). An important aspect of CAT system feasibility is the usefulness of its tests for predicting training success and job performance. Before the paper-and-pencil ASVAB can be replaced by a CAT system, the operations, psychometric characteristics, and predictive utility of the proposed system must be formally evaluated. To conduct these evaluations, it was necessary to design a system for administering experimental personnel tests that would include as many of the proposed final system characteristics as possible.

Objectives

The objectives of the research reported here were to develop (1) an experimental hardware system for CAT, and (2) procedures for administering personnel classification tests on this experimental CAT system.

APPROACH

After an initial configuration of commerically available hardware was chosen for the experimental CAT system, software and hardware components were selected and integrated into an efficient testing system suitable for multiple users. Test items were selected and entered, and a demonstration was held at the Navy Recruit Training Command, San Diego, in April 1982.

After the demonstration, a pilot test was conducted with 232 recruits. Seven testing stations operated simultaneously over a 4-week period, ending in June 1982. The pilot test identified the system's deficiencies and permitted substantial improvements in its efficiency. Test administration operations were analyzed, and a questionnaire concerning user-machine interaction was administered to 204 of the examinees.

A field test of the experimental CAT system was conducted in an effort to examine and validate changes introduced on the basis of the pilot test results. This field test, which was administered to 1,013 recruits and completed in September 1982, identified other ways that the CAT system could be improved and provided the first data for evaluating the feasibility of CAT.

RESULTS

As a result of the preliminary development, demonstration, pilot test, questionnaire responses, and field test, the experimental CAT system configuration was finalized, and test administration procedures were developed. The system will be used to evaluate the feasibility of CAT with Army, Air Force, Marine Corps, and Navy recruits at selected

military bases across the nation. A user manual describing the experimental CAT system and the test administration procedures was developed using the results and recommendations from the pilot and field tests.

The user manual, which is provided in the appendix, will guide test proctors operating the system for the multiservice tests. It provides detailed, step-by-step information, so that proctors will be able to perform all necessary functions during administration of the CAT battery, ensure the safe functioning of all equipment, and transfer test and personnel data to other computer(s) for analysis. It follows the chronological sequence of events necessary for test administration and specifically describes the proctor's responsibilities, preliminary procedures, test administration instructions, and end-of-session procedures.

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APPENDIX

COMPUTERIZED ADAPTIVE TESTING (CAT)
USER MANUAL

March 1984

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SECTION 1

INTRODUCTION

Proctor's Responsibilities

The proctor's areas of responsibility fall into three areas:

1. Test Equipment, which involves:

   a. Storage.
   b. Setup.
   c. Moving.
   d. Checking and maintenance.
   e. Security.

2. Test Administration, which involves:

   a. Collecting information before testing.
   b. Obtaining examinees.
   c. Introducing the test to examinees.
   d. Answering assistance calls.

3. Posttest Procedures, which involve:

   a. Entering examinee data from DD 1966 forms.
   b. Making backup file of test and examinee data.
   c. Transferring data to other computer(s).
   d. Scheduling examinees for next day.

Scope

To help you understand the proctor's role in the computerized adaptive testing (CAT) system, the contents of this manual are summarized below. The manual follows the chronological sequence of events, from setting up the system at the beginning of a testing day to end-of-session procedures at the end of the day. Proctors should use this manual when operating the system.

1. SECTION 2--CAT SYSTEM DESCRIPTION. Each component of the CAT system is listed, and its functions and important features are explained. Diagrams are included to enable proctors to become completely familiar with the system. Proctors should read the descriptions carefully and learn the features and locations of all equipment before attempting to operate any part of the system. Use the system description in Section 2 as a reference when following the instructions in the remaining sections.

2. SECTION 3--GENERAL INSTRUCTIONS AND PRELIMINARY PROCEDURES. Describes procedures that must be in place before beginning testing at a designated site.

3. SECTION 4--EQUIPMENT SETUP AND INITIAL SYSTEM CHECK. Describes how to set up the testing system and check that all equipment is connected and working properly, before testing at a designated site.

4. SECTION 5--STARTUP PROCEDURES. Provides step-by-step procedures for initiating the system before each test session begins.

5. SECTION 6--TEST ADMINISTRATION. Explains the sequence of testing, from the time examinees enter the testing area until they finish the test. Instructions are explained in detail.

6. SECTION 7--END OF SESSION PROCEDURES. Explains the procedures to be followed at the end of a testing day to ensure the safe transfer of data and to prepare for the next test session.

SECTION 2

CAT SYSTEM DESCRIPTION

Equipment Inventory

The CAT system is an operationally independent automated system. It currently includes seven testing stations, each consisting of an Apple III computer and a Sanyo video screen, as shown in Figure 1. Also, a Corvus disk drive, a Corvus constellation multiplexer, a Panasonic videotape recorder, and two Topaz voltage regulators are included to administer the computerized tests on each station. The equipment needed for testing and scoring results is all contained in a single area (Figure 2). Note that the stations are physically separated from the other testing equipment to ensure that examinees are not distracted by noise emitted from the other equipment.

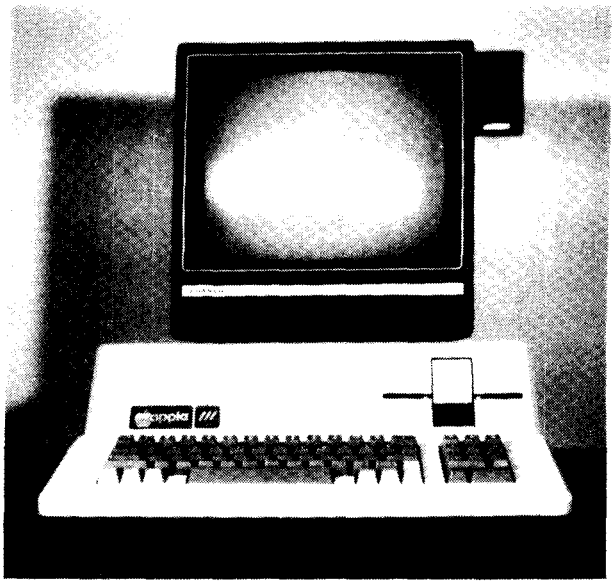


Figure 1. Illustration of a testing station, including the Apple III computer and the Sanyo video screen.

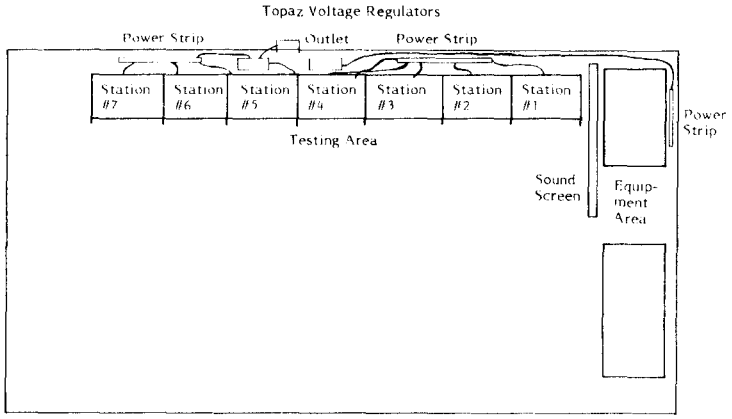


Figure 2. The test area.

The additional items required, which are stored in the test area, are listed below:

1. Floppy diskettes (N = 22).
2. Videocassette tapes (N = 5).
3. Glare screens (N = 7).
4. Power strips (N = 3).
5. Extension cords (N = 3).
6. Ribbon cables (N = 8).
7. Video recorder cables (N = 2).
8. Video output cables (N = 7).
9. Power cords (N = 7).
10. Diskette transfer containers (N = 3).

Descriptions of Test Equipment

This section describes all pieces of test equipment and their functions, so that you can become familiar with the system before using it.

Apple III Computer

The Apple III computer has been programmed to present an adaptive test on the videoscreen, receive responses of examinees, and calculate test scores. For purposes of test administration, you will be concerned with (1) the disk drive and (2) the keyboard (see Figure 3).

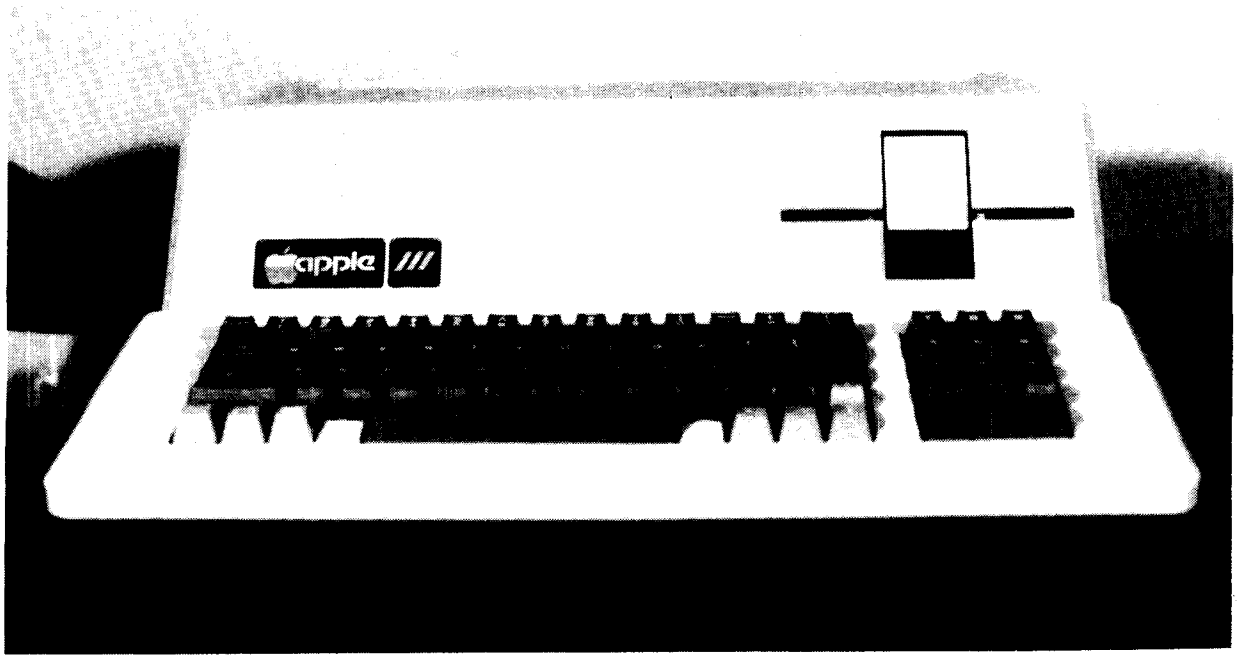


Figure 3. The Apple III computer. Note that there is no cover on the keyboard in this illustration.

The disk drive (right side of Figure 3) enables the user to generate different programs. To execute the programs required for CAT testing, you must insert floppy diskettes into the disk drive of the Apple III when you start up the system. Floppy diskettes are described on pages 7-8.

The keyboard, which is used to "talk to" the computer, has been specially designed for CAT administration. Each keyboard has a temporary cover that permits the pressing of a limited number of keys. If you remove the keyboard cover, you will notice that the letter keys A, B, C, D, and E have been rearranged from the typewriter keyboard position. You will need to remember this when you enter examinee data from the DD 1966 forms.

Proctors will be assigned passwords (or special codes) to access the testing system on the Apple computer.

Sanyo Video Screen

The video screen is placed on top of the Apple III computer, as shown in Figure 1. Its primary function is to display test questions to examinees. It also presents instructions, test results, and other important information.

Each video screen has a glare screen attached to the front to reduce eye strain and fatigue. The video screens can be adjusted for brightness and contrast, in order to present the test as clearly as possible. The adjustment dials are shown in Figure 4 below.

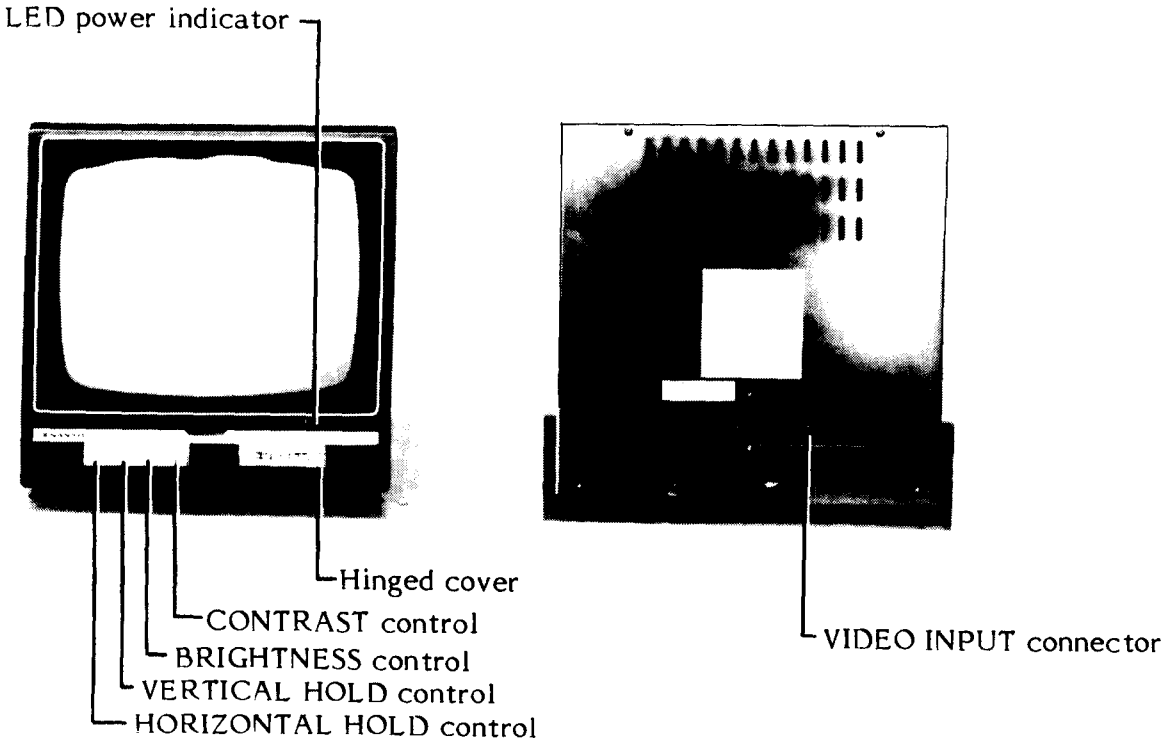


Figure 4. The Sanyo video screen.

Corvus Disk Drive

The Corvus disk drive (see Figure 5) is programmed to collect and store test information obtained from the Apple III computers.

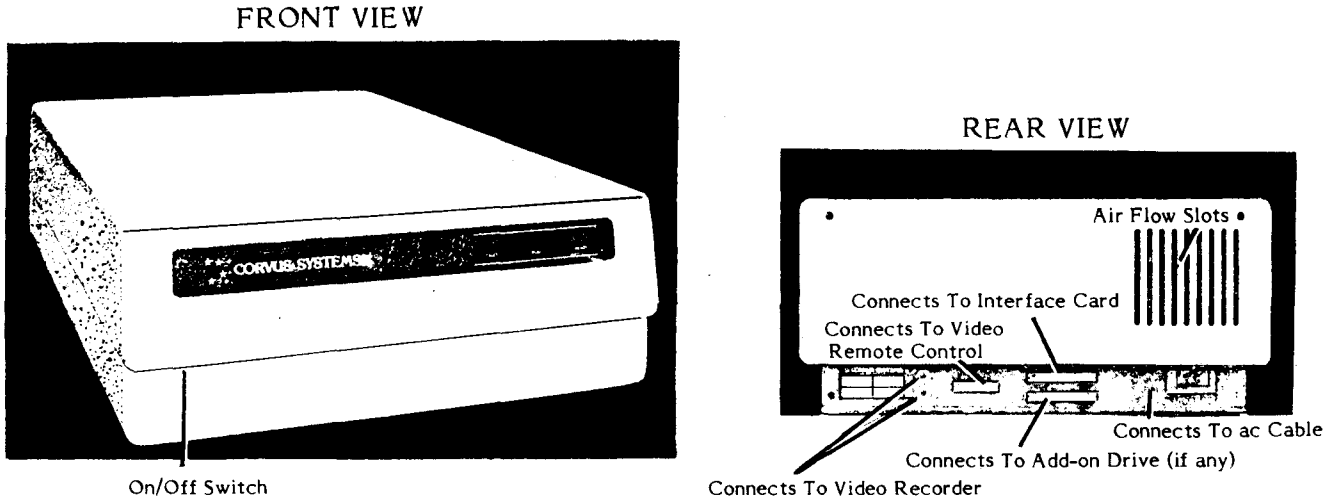


Figure 5. The Corvus disk drive.

The Corvus disk drive differs from the disk drive located in each Apple III computer: The Corvus disk drive administers the test for all the testing stations, while the disk drive in the Apple computer supplies programmed data only to the computer in which it is located.

Corvus Constellation Multiplexer

The Corvus constellation multiplexer (see Figure 6) coordinates the Corvus disk drive with the Apple III computers. It determines the order in which the computers will communicate with the Corvus disk drive.

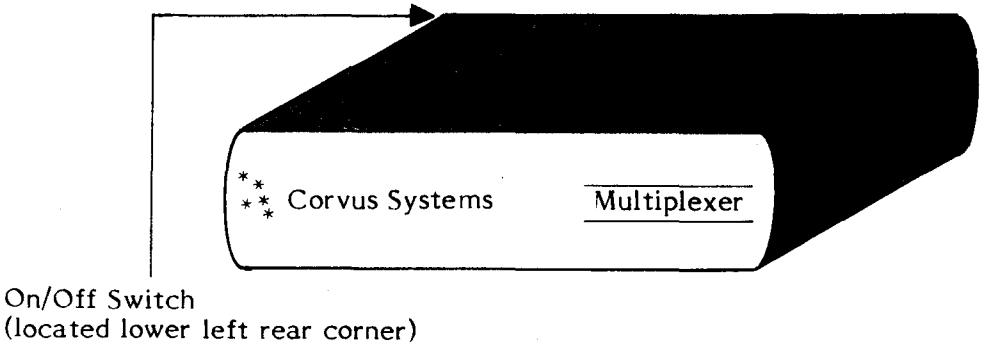


Figure 6. Corvus constellation multiplexer.

Panasonic Videotape Recorder

The Panasonic videotape recorder (see Figure 7) is used in an auxiliary backup procedure or in the event of a loss or change of the CAT program. It can record and store information as instructed by Rehab.

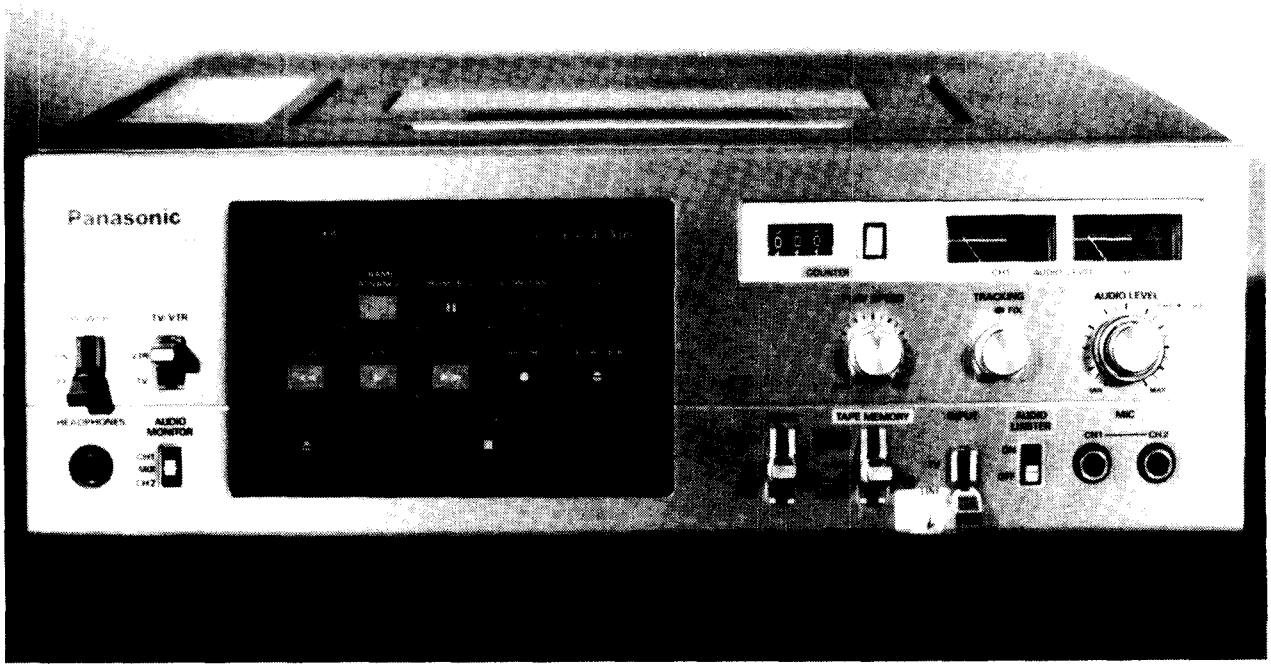


Figure 7. Panasonic videotape recorder.

Topaz Voltage Regulators

The Topaz voltage regulators (see Figure 8) are used to stabilize electrical current, either directly from an external line or from an internal generator. They are used to protect the computer system in case of an unusual drop in or overload of electrical current. They are placed on the floor near testing Stations 4 and 5 (as shown in Figure 2) during test administration.

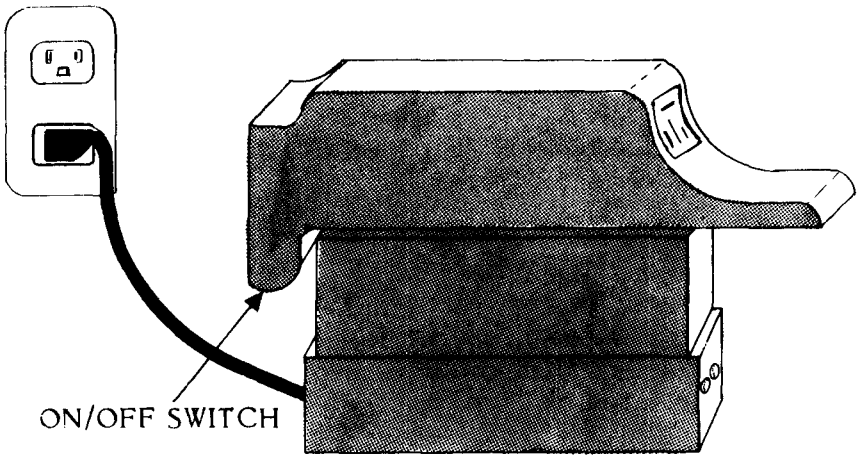


Figure 8. Topaz voltage regulator.

Floppy Diskettes

A floppy diskette (see Figure 9) is a thin, flexible disk made of polyester film coated with a metal oxide compound. The diskette used with the Apple computer is about 5-1/4

inches in diameter and resembles a 45-rpm record. It is mounted and rotates freely within a jacket that prevents damage to the diskette. Floppy diskettes are loaded into the Apple computer's disk drive (see Figure 3). Appendix A provides instructions for care of diskettes.

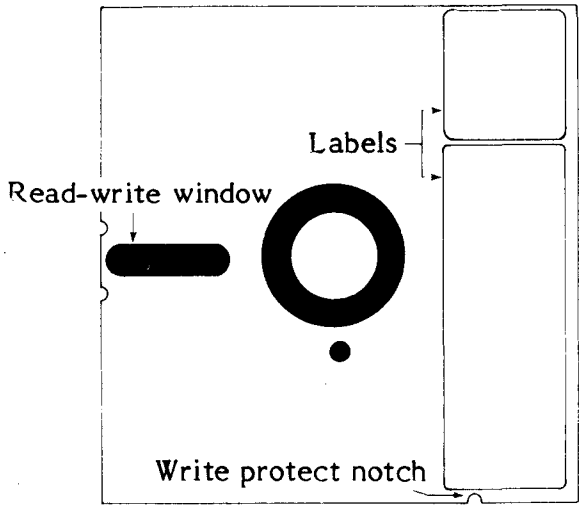


Figure 9. Floppy diskette.

Four types of diskettes are used with the CAT system, as described below.

1. The Confidence diskette (N = 4) is used to check the operating system of the Apple computer.

2. The Thunderclock diskette (N = 4) is used to set the internal clock of the Apple computer.

3. The Newcor 1 (special characters) diskette (N = 7) is used to load the initial information sequence in the Apple computer.

4. The Newcor 2 diskette (N = 7) is used to establish communications between the Apple computer and the Corvus disk drive.

Videocassette Tapes

Videocassette magnetic tapes (see Figure 10) are used with the Panasonic video recorder as backup storage in case of loss of power or other system failure. The tapes are used to store and transfer data files to other computers. Appendix B provides instructions for care of videocassette tapes.

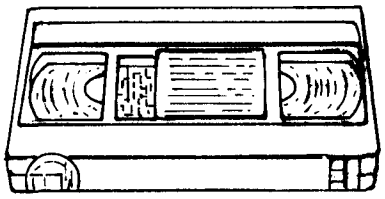


Figure 10. Videocassette tape.

SECTION 3

GENERAL INSTRUCTIONS AND PRELIMINARY PROCEDURES

Before you begin setting up, checking, or otherwise handling the equipment, you must establish (1) a daily report on the test session, and (2) daily logs on examinees and equipment. These are described below.

Daily Report

A daily report similar to the one shown in Figure 11 must be maintained. The report is self-explanatory. It is designed to assist you in keeping information on:

1. Number of personnel tested.
2. Problems encountered during startup of the CAT system.
3. Problems encountered while examinees are testing.
4. Problems encountered with the system's backup procedures.
5. Problems encountered with personnel.
6. General comments, which include incomplete testing information.
7. Action taken to correct problems encountered.
8. Recommendations for changes in procedures or software.

DAILY REPORT

DATE:_____

NUMBER OF PERSONNEL TESTED:_____

CATEGORY	NUMBER	CUMULATIVE TOTAL THRU TODAY
	_____	_____
	_____	_____
	_____	_____
	_____	_____

PROBLEMS ENCOUNTERED DURING STARTUP:

PROBLEMS ENCOUNTERED DURING TEST ADMINISTRATION:

PROBLEMS ENCOUNTERED WITH BACKUP PROCEDURES:

PROBLEMS WITH PERSONNEL:

COMMENTS:

NUMBER INCOMPLETE TESTS: _____
REASONS:

ACTION TAKEN (IF POSSIBLE) TO CORRECT PROBLEM AREAS:

RECOMMENDATIONS:

Figure 11. Example of daily report.

Daily Logs

A number of daily logs must be maintained. These include the following:

1. Pretest Information Log. This log is maintained to record personnel scheduled for the next test session. Required information for each person includes name, social security number, category enlisted under (school), last ASVAB test taken before entry, and general comments. This log can be used as a roster sheet for the next scheduled testing session. Figure 12 presents an example of a pretest information log.

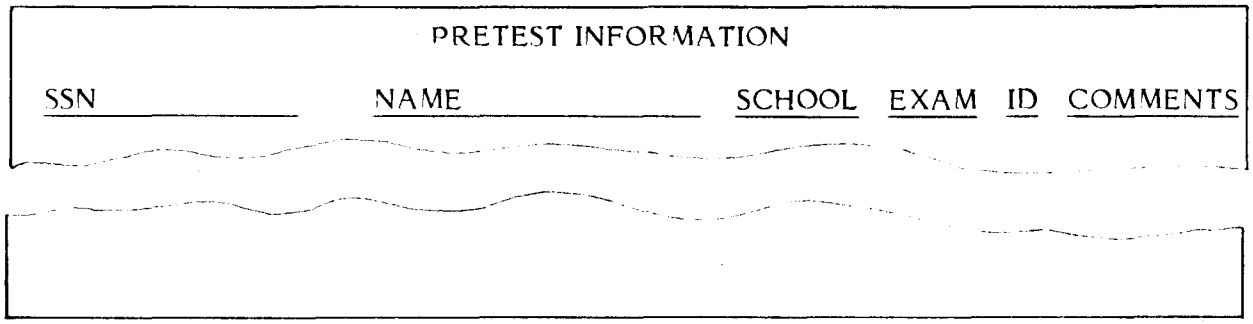


Figure 12. Pretest information log.

2. Video Recorder Log. This log lists video recorder settings for backup data files. It is required to keep track of video recorder settings used. Figure 13 illustrates the information needed.

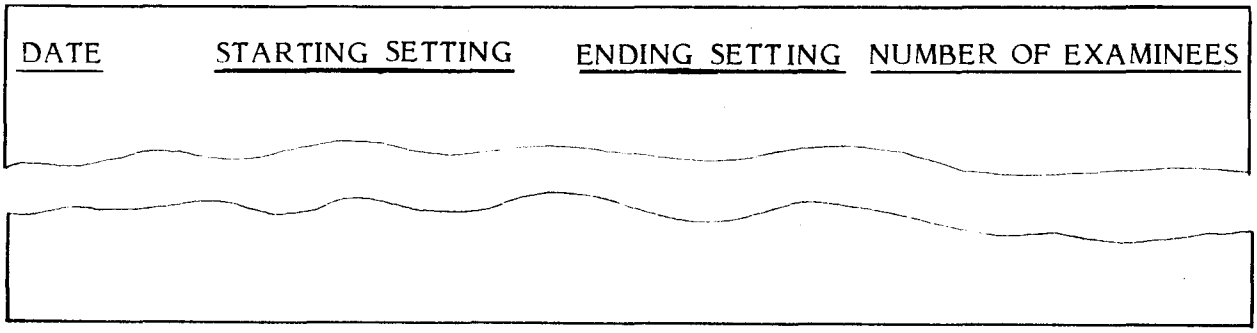


Figure 13. Video recorder log.

3. Diskette Log. This log lists serial numbers of diskettes that have been used. It is maintained to account for floppy diskettes containing test data. This information can be entered in the pretest information log after the completion of a testing day.

4. Proctor Sign-out Log. This log lists procedures for the proctor to follow at the end of each testing day. It serves to remind proctors to turn off the CAT system, turn off the lights, and lock the door to the testing room (see Figure 14). The proctor initials the log at the end of each testing day.

LOG-OUT PROCEDURES

CORVUS DISK OFF												
CORVUS MULTIPLEXER OFF												
APPLE COMPUTERS OFF												
1												
2												
3												
4												
5												
6												
7												
SCREEN OFF												
1												
2												
3												
4												
5												
6												
7												
VIDEO RECORDER OFF												
MAIN POWER SOURCE OFF												
DOOR LOCKED												

Figure 14. Example of log-out procedure sheet.

SECTION 4

EQUIPMENT SETUP AND INITIAL SYSTEM CHECK

As proctor, you are responsible for setting up the CAT system and performing an initial system check on the equipment to ensure that all equipment is functional before used in testing. This process needs to be performed only once at each test site, when the test site is established. When setting up the equipment, the test stations should be separated from the other equipment, as shown in Figure 15.

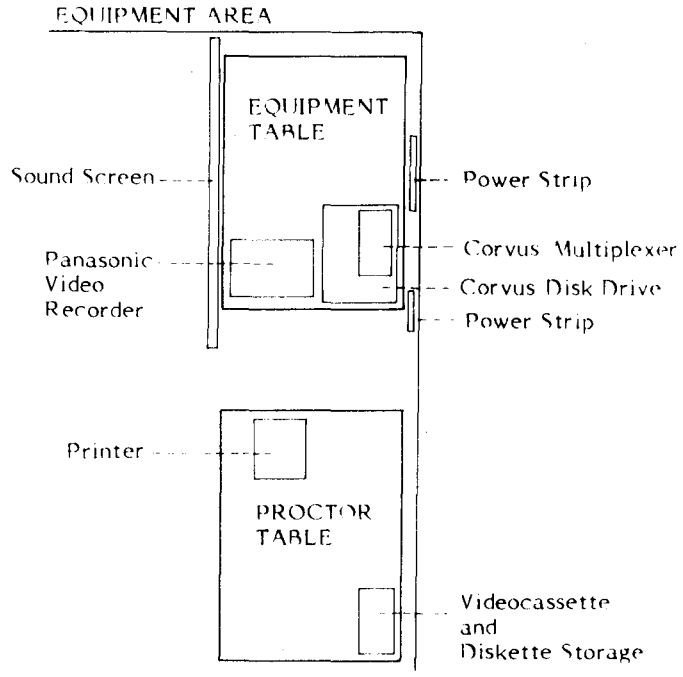


Figure 15. Diagram of the equipment area in a designated test site.

If the equipment is already set up, proceed to Section 5 (Startup Procedures).

Unpacking and Setting Up Equipment

1. Unpack Topaz voltage regulators and connect to electrical outlets.
2. Unpack Corvus disk drive and place on equipment table.
3. Unpack Corvus multiplexer and place on top of Corvus disk drive.
4. Unpack Panasonic videotape recorder and place on equipment table.
5. Unpack Apple III computers. Place one on each desk at a testing station.
6. Unpack Sanyo video screens and place each on top of an Apple computer.

Connecting Equipment

After you have made sure that the switches on the Topaz voltage regulators are turned off, follow the order of procedures listed below:

1. Connect the testing stations.

a. Connect all Apple computers to multiplexer: Using ribbon cable, connect one end to the Apple/Corvus controller card (located inside the Apple computer) and the other end to the multiplexer slot (located inside the multiplexer) (see Figure 16).

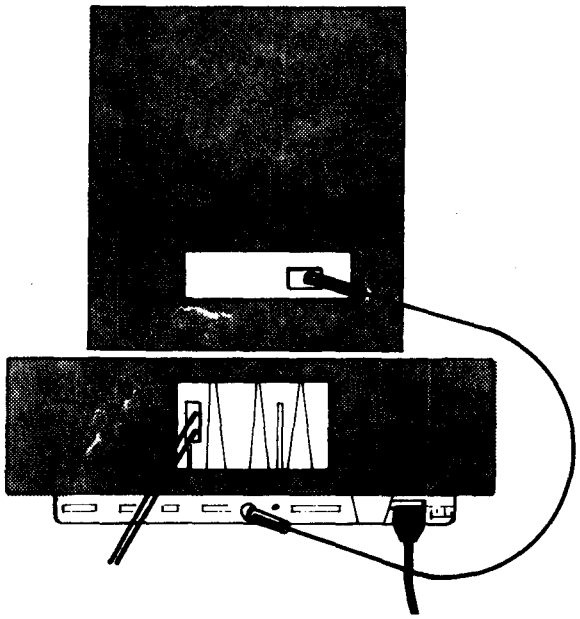


Figure 16. Connections of Apple computer to screen and multiplexer.

b. Connect Apple computers to video screens: Use video output cables, as shown in Figure 16.

c. Connect Apple computers to power supply: Plug in computer to power strip (located under testing station).

d. Connect video screens to power strips (located under testing stations).

2. Connect the multiplexer.

a. Connect multiplexer to disk drive: Use the short ribbon cable and connect one end to the multiplexer output slot (located inside the multiplexer) and the other end to the processor slot on disk drive.

b. Connect the multiplexer to the power source: Plug in multiplexer to power strip (located under equipment tables).

3. Connect the disk drive to power source: Plug in disk drive to power strip (located under equipment table).

4. Connect the video recorder.

a. Connect Panasonic video recorder to disk drive (see Figure 17):

(1) Connect one video cable from output slot of recorder to input slot on disk drive.

(2) Connect the other video cable from the input slot of the recorder to the output slot of the disk drive.

b. Connect Panasonic video recorder to power source: Plug in recorder to power strip (located under equipment table).

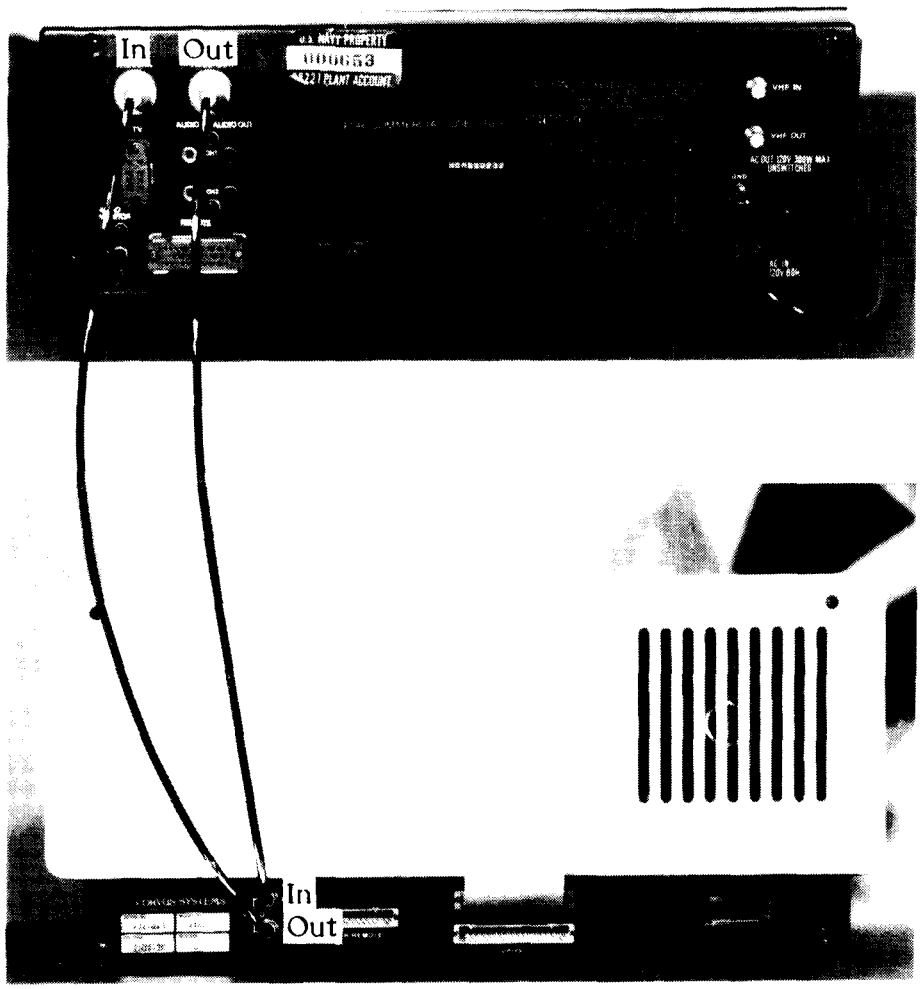


Figure 17. Correct connection of video recorder to Corvus disk drive.

Initial Equipment Check

After the system is connected, a preliminary check should be made to ensure that the equipment is working properly. This preliminary check is needed when equipment is initially connected or when the system has malfunctioned. Locations of on/off switches for all pieces of equipment are shown in Section 2.

It is essential that these steps are followed in the order shown.

1. Turn on Topaz voltage regulators.
2. Turn on power strips. A light will come on indicating that (a) power is in the circuit and (b) the Topaz voltage regulators are on.
3. Turn on Apple III computers. An indicator light next to the Apple keys should be activated.
4. Turn on video screens. A red light should appear on the front panel.
5. Turn on multiplexer. A red light on the front panel should be activated.
6. Turn on the Corvus disk drive. Three red lights should be activated.
7. Turn on Panasonic video recorder. A white light should be activated.
8. If the system is going to be used immediately, all the equipment except the video recorder can be left on. If the system is not going to be used, it should be turned off in reverse of the order listed above.

If all equipment appears to be working properly, go on to the startup procedures (Section 5).

SECTION 5

STARTUP PROCEDURES

When you have completed the preliminary checks on the CAT system, you are ready to start the system. The four major steps in system startup are:

1. Check status of Apple III computers.
2. Set the computers' internal clocks.
3. Initialize the system.
4. Prepare for examinees.

The first three steps must be performed on each Apple computer separately. For the fourth step, you must use one of the test stations as a proctor station. For purposes of simplicity, Station 7 has been designated as the proctor station. Therefore, the sequence of initializing and starting the system on Station 7 will differ from the sequence for Stations 1 through 6.

The following is a step-by-step guide for starting up the CAT system. It is essential that these procedures are followed in the sequence indicated.

Check Status of Apple III Computers

1. Verify that Topaz voltage regulators are connected to electrical outlet and are turned on.

2. Insert the Confidence diskette into the Apple computer's disk drive at Testing Station 1.

3. Turn on the Apple computer.

4. When the Confidence diskette has activated, the following will appear on the screen:

MACHINE STATUS
MEMORY TEST
DISK TEST
VIDEO TEST
CONTINUOUS TEST
QUIT

5. Press the RETURN (or YES) key.

6. The computer will self-test. If the computer is in the proper working condition, a message will appear on the video screen:

I'm OK, machine status normal.

If you get this response, proceed to step 7. If the machine does not indicate that everything is normal, turn it off and caii Rehab for help.

7. After the **I'm OK** message appears, remove the Confidence diskette.

Set the Computers' Internal Clocks

1. Insert the Thunderclock diskette into the Apple computer's disk drive at Station 1.

2. Press the CONTROL and RESET keys simultaneously. The day, date, and time will show on the screen. If the day, date, and time are correct, proceed to Step 4.

3. If the day, date, or time is wrong, instructions will appear on the screen for correction.

4. When the day, date, and time are correct, remove the Thunderclock diskette.

Initialize the System

1. Verify that the Corvus disk drive is on. Wait until the ready light is on before proceeding.

2. Insert NEWCOR 1 (special character) diskette.

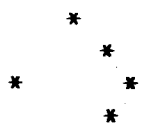
3. Press the CONTROL and RESET keys simultaneously. The following message will appear on the screen:

Put Pascal System Disk in built-in drive. Press RETURN.

4. Remove NEWCOR 1 diskette and insert NEWCOR 2 diskette.

5. Press RETURN (or YES) key. The following message will appear on the screen:

CORVUS CONSTELLATION



PLEASE ENTER YOUR NAME:

6. For now, do not proceed further at Station 1. Repeat the steps on pp. 15 and 16 for Stations 2 through 7. Testing Station 7 is now ready for use as a proctor station, which is described below.

7. At each of Stations 1 through 6, follow these steps:

   a. Enter your assigned name code.

   b. Press the RETURN (or YES) key. The following will appear on the screen:

COMMAND: E(DIT, R(UN, F(ILE, C(OMP,
L(INK, X(ECUTE, A(SSET

   c. Type "X" and wait. A message, **Execute what File?:**, will appear.

   d. Type "CATDATA:CAT-256K" and then press RETURN (or YES) key.

   e. Test Stations 1 through 6 are now ready for testing.

Prepare for Examinees

For this step, you should use Testing Station 7, which has been designated as the proctor station. This step is not repeated at other stations. Also, before admitting the examinees to the testing room, you should:

1. Check to ensure that the room is neat.

2. Check to ensure that each test station has an adequate supply of scratch paper and sharpened pencils. Keep extra pencils and paper on the proctor table for use as needed.

3. Adjust lights and terminals for best visibility. Dim the lights and examine the display on a screen from a seated position. Adjust for brightness and contrast as necessary. Repeat this procedure at each testing station before proceeding further.

4. Ensure that keyboard covers are in place.

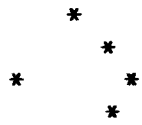
This step includes three procedures, which are described below.

Enter Examinee Social Security Numbers

You should have with you the service records of the examinees for the day. Form DD 1966 in the record contains the social security number, which must be entered prior to test administration.

1. Proceed to Station 1. Remove keyboard cover. The following display should still be on your screen:

CORVUS CONSTELLATION



PLEASE ENTER YOUR NAME:

2. Enter your assigned name code and then press the RETURN (or YES) key. The following will appear on the screen:

COMMAND: E(DIT, R(UN, F(ILE, C(OMP,
L(INK, X(ECUTE, A(SSET

3. Type "X" and wait. A message, **Execute what File?:**, will appear.

4. Type "CATDATA:E.MGR" and then press the RETURN (or YES) key. The following menu will appear:

EXAMINEE MANAGER MENU

Select one of the following procedures by entering its number.
Currently managing session files.

1. Quit
2. Log Examinee into System
3. Enter Examinee into System
4. View Examinee Records
5. List Directory
6. Separate Done/Not Done Examinees
7. Select Files to Manage
8. Remove Examinee
9. Purge Directory

Enter Choice #:

5. Type "2" to begin entering examinees' social security numbers. The following will appear:

Enter Examinee Social Security Number: _____ <return>

6. Type in an examinee social security number and press RETURN (or YES) key. A screen will appear with the social security number you entered. For example:

Examinee 122-35-6775 entered into system. Press <return> to continue.

7. Press the RETURN key to return to the menu in Step 4. Repeat Steps 5 and 6 until all examinees' social security numbers are entered.

Enter Examinee Personal History Data

Once you have entered examinee social security numbers, you may begin entering examinee history data or you may enter the data while examinees are taking the test. It is extremely important that each examinee's data be entered before he or she completes the test. Otherwise, the system will not save examinee data with the automatic backup procedures. The menu, as shown in Step 4, should be displayed on the screen. Regardless of when you enter examinee personal history, the following procedures apply:

1. Type "3" to begin. The following will appear on the screen:

Enter Examinee Social Security Number: _____ <return>

2. Enter an examinee's social security number and press the RETURN key. The following will appear:

Data entry instructions: to enter/modify data, type in the data you want and then press <return> to accept that data. To skip the current field, just press <return> and the <escape>.

Last Name:
First Name:
Middle Initial:
Current Address (State):
Home of Record (State):
Citizenship:
Sex:
Population Group:
Ethnic Group:
Marital Status:
Number of Dependents:
Date of Birth:
Education:
Test ID:
AFQT:
ASVAB Scores:
Date of Enlistment:
Active Service Data:
Rating / MOS:
AFEES:
Branch of Service:
Retest of ASVAB:
Test Order:

3. Type the personal information as shown above by using the examinee's application for enlistment (DD Form 1966), page 1, provided in the service record.

4. Verify information for accuracy. If information is correct, press ESCAPE. If information is not correct, press RETURN. The cursor will return to top of examinee data menu. You can then correct wrong data. Press ESCAPE when all data are correct.

5. Repeat Steps 1 through 4 until all data on each examinee have been entered.

6. After all examinee history data have been entered, you are ready to prepare Station 7 for use as a test station. Type "1" to quit examinee menu.

Execute Test Administration Program

1. After you type "1" in Step 6 above, the following menu should appear:

CAT PROJECT MENU

Select one of the following programs by entering its number.

1. **Quit**
2. **Test Administration**
3. **Configure Test Parameters**
4. **Test Database Management**
5. **Examinee Database Management**
6. **Strategy Database Management**
7. **Graphics Editor**

Enter Choice #:

2. Type "2." Replace keyboard cover. Computer at Station 7 is now ready for testing.

SECTION 6

TEST ADMINISTRATION

Pretest Procedures

At this point, you admit the examinees to the testing room. However, the following procedures must be followed before they begin the test.

1. Proctor greets examinees. After admitting the examinees to the testing room, identify yourself and then identify the examinees. Make sure that the social security numbers of examinees present match the numbers you have entered into the system for the testing session. There should be no unmatched social security numbers and no additional examinees.

2. Proctor introduces the CAT system. Give a standardized brief introduction (no more than 60 seconds) to the examinees (see Appendix B). You may either read it or "ad lib." Only minimal information is appropriate for the introduction.

3. Examinees complete the authorization forms. Each examinee must complete an authorization form (with privacy act statement--see Appendix C) before taking the test. Give each examinee an authorization form, and check to ensure that the completed form includes the examinee's name, social security number, and signature.

> IMPORTANT: AN EXAMINEE WHO DOES NOT SIGN THE FORM CANNOT BE ADMITTED TO A TESTING STATION.

4. Proctor assigns examinee test stations and gives final instructions. After examinees have completed the authorization form, you will instruct them one at a time to proceed to a vacant test station and be seated. When examinees have been seated, proceed with these final instructions:

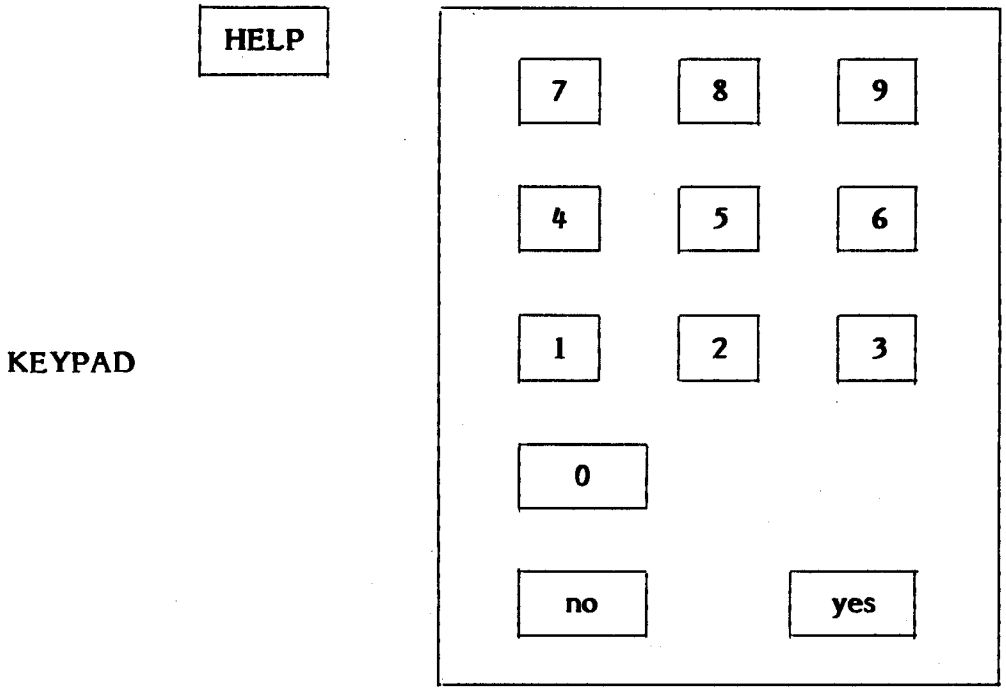
a. If a key is held down too long, a beeping sound will be emitted from the computer.

b. If a key press occurs outside the permitted range (such as a number instead of a letter), a beeping sound will be emitted from the computer.

Test Begins: Familiarization Sequence

Before examinees answer test questions, they complete a familiarization sequence on the computer. This sequence is followed by a test simulation (described on page 23).

When the examinees are seated at testing stations, they see the following display on the video screens:



Welcome. Here are some instructions on how to use the test computer. First notice the numeric keypad on the far right of the keyboard.

Find the "7" key at the upper left and press it.

Key Functions

The examinee will be asked to use all numeric keys (0-9), certain letter keys (A-E), and four other keys labeled YES, NO, HELP, and ERASE. The numeric, letter, YES, and NO keys are used to answer and confirm test questions. The ERASE key is used to backspace over the character(s) entered, erasing the character(s) and making it possible for the examinee to reenter a response. The HELP key signals the proctor that an examinee needs assistance.

Test Simulation

The test simulation is designed to make sure that the examinees know how to respond to test questions. Examinees are presented with two sample test questions during the introduction. (Sample questions are also given before each subtest.) During this test simulation, examinees will be able to see whether they have answered the questions correctly. After this sequence, examinees start the test.

Instructions for Proctors: What to do When the HELP Key is Pressed or When the Computer "Locks"

In spite of the extensive familiarization and test simulation sequences, some examinees will have difficulty in pressing the appropriate keys. When this occurs, the examinee may call you by (1) pressing the HELP key, which emits a beeping sound, or (2) personally calling for your assistance. At other times, an examinee may make certain critical errors. If this occurs, the computer will "lock" to prevent the examinee from proceeding further until you assist him at his testing station.

When you are summoned to help an examinee, you must follow these procedures:

1. Determine the cause of difficulty (difficulty will generally arise from pressing an inappropriate key).

2. Decide which action to take, based on the examinee's performance and his place in the test.

You must handle this process with caution. Do not coach examinees in any way.

When the computer "locks" or the HELP key is pressed, a "menu" appears on the screen. The menu will tell you which alternative actions you can take at that point. For example, during the test simulation, the following will appear:

PROCTOR MENU

Select one of the following options by entering its number, then pressing the <YES> key.

1. **Return to testing procedures.**
2. **Exit subtest instructions/samples.**
3. **Go on to next subtest.**
4. **Go on to next session.**

Enter choice #, then press <YES>.

To "unlock" the computer, you must first enter a password, which is provided before you administer your first test. Then you can press the appropriate key for the action you wish to take. For example, "1" returns to the test procedures.

Continuing the Testing Session

After an examinee is seated at the testing station, he works at his own speed. The computer records his testing time automatically.

It is your responsibility to have a continuous stream of examinees go through the testing system with minimal disruption to those already taking the test. This is accomplished by the following procedures:

1. When an examinee has finished taking the test, help him to leave the testing area as quickly and quietly as possible.

2. After he or she has left, admit one examinee to the testing room, give the standard introduction in a low voice, and instruct him or her to read and sign the privacy act authorization form away from the test stations.

3. If the examinee's social security number has not been entered into the system, follow these procedures:

a. Remove the keyboard cover and press the ESCAPE key. The following message will appear:

CAT PROJECT MENU

Select one of the following programs by entering its number.

1. Quit
2. Test Administration
3. Configure Test Parameters
4. Test Database Management
5. Examinee Database Management
6. Strategy Database Management
7. Graphics Editor

Enter Choice #:

b. Type "5." The following will appear:

EXAMINEE MANAGER MENU

Select one of the following procedures by entering its number. Currently managing session files.

1. Quit
2. Log Examinee into System
3. Enter Examinee into System
4. View Examinee Records
5. List Directory
6. Separate Done/Not Done Examinees
7. Select Files to Manage
8. Remove Examinee
9. Purge Directory

Enter Choice #:

c. Type "2." Then enter the social security number of the new examinee. Press the RETURN key. (This procedure was explained in more detail in Section 5, Startup Procedures.)

d. You must enter the examinee's history data before he or she finishes the test. After he has begun, follow the instructions on pages 19 and 20.

After the examinee is seated at the testing station, wait nearby for a few moments in case he has any questions.

SECTION 7

END-OF-SESSION PROCEDURES

This section explains the procedures for backing up, storing, and transferring data after a test session has ended. The proctor also is responsible for setting up the test area for the next test session. Before starting end-of-session procedures, be sure that all examinees have left the testing room.

The nine end-of-session procedures are listed below and the steps in each are given below. The steps must be followed in the sequence given.

1. Exit from testing mode.
2. Verify test completion of examinees.
3. Transfer data to other computer(s).
4. Erase data from Corvus disk drive.
5. Turn off the CAT system.
6. Prescreen examinee data for next testing session.
7. Check testing area for cleanliness and orderliness.
8. Transfer data physically to Rehab office.
9. Follow sign-out procedures.

Exit From Testing Mode

1. When the last examinee has finished taking the test, go to Station 7. Remove the keyboard cover.

2. Press the ESCAPE key. The following will appear on the screen:

CAT PROJECT MENU

Select one of the following programs by entering its number.

1. **Quit**
2. **Test Administration**
3. **Configure Test Parameters**
4. **Test Database Management**
5. **Examinee Database Management**
6. **Strategy Database Management**
7. **Graphics Editor**

Enter Choice #:

3. Type "5." The following menu will appear:

EXAMINEE MANAGER MENU

Select one of the following procedures by entering its number. Currently managing session files.

1. **Quit**
2. **Log Examinee into System**
3. **Enter Examinee into System**
4. **View Examinee Records**
5. **List Directory**
6. **Separate Done/Not Done Examinees**
7. **Select Files to Manage**
8. **Remove Examinee**
9. **Purge Directory**

Enter Choice #:

Verify Test Completion of Examinees

When the examinee manager menu is on the screen, as shown above, type "5." This will show you whether all the examinees have completed the tests. If so, press the RETURN key to go back to the examinee manager menu.

Transfer Data to Other Computer(s)

Procedures for transfer of CAT examinee data have been developed to ensure efficiency and minimize loss or degradation of data. It is essential that proctors follow these instructions carefully.

Transfer Examinee Text Files to Floppy Disks

1. At this point, you should have the following menu on the screen:

EXAMINEE MANAGER MENU

Select one of the following procedures by entering its number. Currently managing session files.

1. **Quit**
2. **Log Examinee into System**
3. **Enter Examinee into System**
4. **View Examinee Records**
5. **List Directory**
6. **Separate Done/Not Done Examinees**
7. **Select Files to Manage**
8. **Remove Examinee**
9. **Purge Directory**

Enter Choice #:

2. Type "1." The following will appear on the screen:

CAT PROJECT MENU

Select one of the following programs by entering its number.

1. **Quit**
2. **Test Administration**
3. **Configure Test Parameters**
4. **Test Database Management**
5. **Examinee Database Management**
6. **Strategy Database Management**
7. **Graphics Editor**

Enter Choice #:

3. Type "1." The following will appear on the screen:

COMMAND: E)dit, R)un, F)ile, C)omp, L)ink, X)ecute, A)ssem, ?

4. Type "F." The following will appear:

FILE: L)dir, E)xt-dir, R)em, T)rans, C)hng, D)ate, P)refix, Q)uit, ?

5. Remove the Newcor 2 diskette and insert a blank diskette.

6. Type "T." The following will appear:

Transfer what file?

7. Type in ".C4/?" and then press the RETURN (or YES) key. The following will then appear:

To what file?

8. Type in ".D1/$" and then press the RETURN (or YES) key.

9. A file indicated by social security number will appear on the screen. Press the RETURN (or YES) key until the appropriate file appears on the screen.

10. Type "Y" and repeat until all files are transferred to the diskette.

11. Remove the diskette and place in designated transfer container.

12. Insert the Newcor 2 diskette and type "Q."

Transfer Examinee and Test Data to Videotape

1. The following should be on the screen:

COMMAND: E)dit, R)un, F)ile, C)omp, L)ink, X)ecute, A)ssem, ?

2. Type "X." A message, **Execute what file?**, will appear.

3. Type ".C1/mirror" and press RETURN. The following will appear on the screen:

Mirror: I)dent, B)ckup, R)store, V)rify, Q?

4. Type "B." The following will appear:

Backup a: V)olume, D)rive, P)hys.Drv:

5. Type "V." The question **Which volume?** will appear on the screen.

6. Type "QTEXT" and RETURN (or YES). **Date: 1-Jan-0** will appear on the screen.

7. Enter the current day, month, and year in this format: DD-month-YY (Example: 05-may-82). Press RETURN. **TIME:** will appear on the screen.

8. Since time is not currently used, press RETURN. **NAME:** will appear.

9. Type "QTEXT" and press RETURN (or YES). **COMMENT** will appear on the screen.

10. If you have any comments to enter, type them in. If not, press RETURN (or YES). The following will appear on the screen:

Position recorder and start record. Press <return> when ready.

11. Turn on the video recorder. Press the EJECT button on the recorder and insert an unused video tape.

12. Set counter key to 000. Press the FAST FORWARD button and advance the tape to predetermined number is indicated in log.

13. Press the STOP button when at the desired number.

14. Press the PLAY and RECORD buttons simultaneously.

15. Immediately go to computer and press the RETURN. The Corvus disk drive will indicate that it is busy by a blinking light. The following will appear on the video screen:

Backup in progress.....

16. When all data are backed up, the computer will beep. Press the STOP button on the video recorder. The following will be on the screen:

Backup finished

Error status:

Disk errors: 0

---All data stored---

17. Record the tape position number in the log (explained in Section 3).

18. Press the REWIND button on the video recorder.

19. When the videotape is rewound, press the EJECT button. Remove the videotape and place it in its container.

20. Turn off the recorder and replace the cover.

21. Type "Q" on the computer. The following will appear on the screen:

COMMAND: E)dit, R)un, F)ile, C)omp, L)ink, X)ecute, A)ssem, ?

22. Type "F." You are now ready to either erase data from the Corvus disk drive or turn off the CAT system.

Erase Data From Corvus Disk Drive

At the end of a week of testing, or as requested by Rehab, the test data must be erased from the Corvus disk drive. This is necessary to permit storage of new data. However, data must not be erased without approval from Rehab's project manager or data manager.

1. After transferring data, the following menu should be on the screen:

FILE L)dir, E)xt-dir, R)em, T)rans, C)hng, D)ate, P)refix, Q)uit, ?

2. Type "R." The following will appear:

Remove what file?

3. Type in ".C4/?." Then press the RETURN (or YES) key.

4. A file number, indicated by social security number, will appear on the screen. Press the RETURN (or YES) key until the number of the file you wish to erase appears on the screen.

5. Type "Y."

6. Repeat steps 4 and 5 until all files designated for removal have been erased.

7. A statement will appear on the screen: **"update directory."** Type "Y." The screen as shown in step 1 will appear when directory has been updated.

Turn Off the CAT System

This sequence must be followed as indicated:

1. Turn off Corvus disk drive.
2. Turn off Corvus multiplexer.
3. Turn off Apple computers and screens at all stations.
4. Turn off Topaz voltage regulators.
5. Unplug Topaz voltage regulators.

Prescreen Examinee Data for Next Testing Session

In some cases, the proctor will be able to prescreen service records of personnel for CAT testing. Prescreening service records will assist you in preparing for the next testing session. Remember that service record data are confidential and should remain so. Follow these steps:

1. Locate service records of personnel scheduled for testing.

2. Review DD Form 1966 in service record to see whether each person meets requirements for CAT testing (i.e., he or she is designated to attend the selected Navy "A" schools.)

3. Record name, social security number, and other pertinent information in your log. This will give you a roster of personnel for the next training session.

4. Return service records as required.

Check Testing Area for Cleanliness and Orderliness

1. Check to see that all chairs and tables are clean and neatly arranged.

2. Check all video screens for cleanliness and clean if necessary.

3. Place clean scratch paper at each testing station.

4. Place sharpened pencils at each testing station.

Transfer Data Physically to Rehab Office

1. Place diskettes of the day's test data in the designated transfer container.

2. Deliver the container to the Rehab office immediately following the test session.

Follow Sign-out Procedures

1. Ensure that the CAT system has been turned off, the lights have been turned out, and the door has been locked.

2. Write your initials and the date in the space provided.

APPENDIX A

INSTRUCTIONS FOR CARE OF FLOPPY DISKETTES AND VIDEOCASSETTE TAPES

INSTRUCTIONS

Floppy diskettes and videocassette tapes are extremely fragile. Below are instructions for ensuring proper care.

Floppy Diskettes

1. Always keep a diskette in its paper envelope when not in use.

2. Store diskettes in a vertical position like phonograph records.

3. Never touch the surface of a diskette or try to wipe the surface of a diskette with any piece of cloth.

4. Keep diskettes away from extreme heat, such as that produced by radiators, direct sun, or other sources of heat.

5. Never bend a diskette.

6. When writing on a diskette's label, use only felt tip pens. Never use any instrument with a sharp point.

7. Keep diskettes away from magnetic fields, such as those generated by electrical motors, radios, or tape recorders. A strong magnetic field may erase data on a diskette.

8. Never remove a diskette while the drive is running. (You can tell if a drive is running by the sound of the motor and the "in use" light on the front of the drive.) Doing so may cause permanent damage to the diskette.

Videocassette Tapes

1. Keep videocassettes at room temperature for at least 1 hour before being used.

2. Always keep cassettes in a cool, dry place. Avoid storage in direct sunlight or near sources of heat.

3. Keep cassettes away from electrical motors, power transformers, or equipment that causes a magnetic field.

4. Do not drop cassettes.

5. Store cassettes in a vertical position.

6. Do not splice videotapes or attempt to repair them.

7. Do not touch tape surface.

APPENDIX B

INTRODUCTION TO EXPERIMENTAL TEST

INTRODUCTION TO EXPERIMENTAL TEST

Good morning (afternoon), I am (proctor's name), representing a firm called RGI. RGI is under contract to the Navy to evaluate a computerized adaptive testing system called CAT. This system uses computer technology that adapts the test to each individual as he or she takes the test. The results of this experimental system will be evaluated based on your test results. This system could have a significant impact on future generations of Navy persons, by ensuring an effective and efficient test battery. This test has no bearing on you or your Navy service, and your scores will not be released to anyone outside the firm--they will be used only during the evaluation phase of the system, and then destroyed. Your participation is appreciated. Please take a seat at a test station when told to do so. Follow the instructions presented on the computer screen. If you have problems, the computer will tell you what to do.

APPENDIX C

PRIVACY ACT AUTHORIZATION STATEMENT

PRIVACY ACT AUTHORIZATION STATEMENT

-COMPUTERIZED TESTING-
EXAMINEE INFORMATION

This research project consists of a computerized test similar to the Armed Services Vocational Aptitude Battery (ASVAB). The results of this project will be used to improve recruit testing and school placement. In this project, scores on the computer test will be compared to success in school to determine how well the test can predict school performance. There are no risks or hazards that could result from your participating in this study; there could, however, be many benefits from this study to future recruits, the military, and our nation's defense. The results could help to make future recruiting and placement tests:

1. Shorter.
2. More effective.
3. Less costly.
4. More secure.

If you have any questions concerning the procedures, or if you do not want to participate further in this program, please so state to the Proctor at this time. If you would like to participate in this research project, please continue.

Data obtained as a result of this study will be used only in the conduct of the study as described above. Your name and social security number are required only to match test scores and school performance information and will be destroyed after all data are matched. Name and social security number information will not be released nor used in any part of the study.

PLEASE COMPLETE THE FORM BELOW BEFORE TAKING THE TEST

I hereby consent to the use of my name, social security number, and test scores in the conduct of the study described above. I further consent to the review of data concerning my performance in school that I am scheduled to attend after completion of basic training.

Name_____
PRINT Last First Middle Initial

Social Security Number_____-____-_____

Signature_____
SIGN first name, middle initial, last name

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